

### TOSS-UP

1. PHYSICAL SCIENCE: Multiple Choice: The so-called "Main Belt" of asteroids lies in the area between what two planets?

- W) Venus and Mercury
- X) Jupiter and Saturn
- Y) Pluto and Neptune
- Z) Mars and Jupiter

ANSWER: Z) Mars and Jupiter

### BONUS

1. PHYSICAL SCIENCE: Short Answer: The phrase "mad as a hatter" comes from the days when hat makers damaged their nervous systems by long-term exposure to this substance used in making felt hats. Name this metallic element that turns to liquid at room temperature.

ANSWER: mercury

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### TOSS-UP

2. LIFE SCIENCE: Short Answer: A 2004 study showed, to the surprise of almost no one, that "anti-bacterial" soaps kill bacteria but don't kill what type of organism that causes the common cold?

ANSWER: viruses

### BONUS

2. LIFE SCIENCE: Multiple Choice: The term that describes a flower that is a combination of two different species is:

- W) combination
- X) mixture
- Y) hybrid
- Z) compound

ANSWER: Y) hybrid



### TOSS-UP

3. MATH: Multiple Choice: Which of these containers holds the most volume?

- W) a 1500-cc graduated cylinder
- X) a one-liter bottle
- Y) a 46-ounce can
- Z) a half-gallon jug

ANSWER: **Z) a half-gallon jug** (64 oz; 1500 cc = 50.7 oz, one liter = 33.8 oz.)

### BONUS

3. MATH: Short Answer: Give the value of y that solves the equation  $11y + 8 = 96$ .

ANSWER: y = **8**

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### TOSS-UP

4. PHYSICAL SCIENCE: Multiple Choice: Which of the following devices is NOT generally classified as a "simple machine"?

- W) pulley
- X) inclined plane
- Y) lever
- Z) staircase

ANSWER: **Z) staircase**

### BONUS

4. PHYSICAL SCIENCE: Multiple Choice: Except for helium (which has two), atoms are generally most stable when they have how many electrons in their valence shells?

- W) 6
- X) 8
- Y) 16
- Z) 32

ANSWER: **X) 8**

### TOSS-UP

5. GENERAL SCIENCE: Short Answer: Its unusual versions include one for left-handers and one where the index finger is higher than the middle finger. Name this computer device that even has a tailless version, called a "hamster."

ANSWER: mouse

### BONUS

5. GENERAL SCIENCE: Short Answer: The idea that text appears exactly the same way on a computer screen as it does on paper is expressed by the acronym WYSIWYG [WIZZ-ee-wig], which stands for what 7-word phrase?

ANSWER: What You See Is What You Get

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### TOSS-UP

6. LIFE SCIENCE: Short Answer: The scape (connected to the head), a pedicel in the middle, and a long flagellum at the top are the main sections of what insect appendage?

ANSWER: antennae

### BONUS

6. LIFE SCIENCE: Multiple Choice: The Indo-Chinese, the South China, the Sumatran [soo-MAW-trun], the Siberian and the Bengal are the earth's 5 remaining subspecies of:

- W) tigers
- X) elephants
- Y) cheetahs
- Z) cobras

ANSWER: W) tigers



### TOSS-UP

7. EARTH SCIENCE: Short Answer: A storm with winds of more than 74 miles per hour is called a "typhoon" in the Pacific Ocean and a what in the Atlantic Ocean?

ANSWER: hurricane

### BONUS

7. EARTH SCIENCE: Short Answer: The "intrusive" variety tends to cool slowly, while the "extrusive" variety is often ejected into the air from a volcanic eruption. Name this type of rock that includes feldspar and granite.

ANSWER: igneous rock

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### TOSS-UP

8. MATH: Short Answer: You eat dinner with your parents and the bill is \$32. If they tip the waitress 15%, how much is the total bill?

ANSWER: \$36.80 (\$32 x 1.15)

### BONUS

8. MATH: Short Answer: Give the TWO values of x that satisfy the equation  $x^2 + 3x - 10 = 0$ .

ANSWER: 2 and -5



### TOSS-UP

9. LIFE SCIENCE: Short Answer: If you find someone lying unconscious who doesn't appear to have a pulse or to be breathing, then you might give them sets of 15 chest compressions and two quick breaths as part of what first-aid procedure?

ANSWER: cardiopulmonary resuscitation or CPR

### BONUS

9. LIFE SCIENCE: Short Answer: Playing too many video games instead of being outside with your friends might not only make you fat, but might cause you to develop "rickets", a disease caused by the lack of what vitamin, manufactured naturally by the body from sunlight and often added to milk?

ANSWER: Vitamin D

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### TOSS-UP

10. GENERAL SCIENCE: Short Answer: It can be made of sodium percarbonate and kills bacteria, disinfects, and serves as a wonderful cleaning agent. Name this substance that also has an unfortunate tendency to remove the color from your favorite clothing.

ANSWER: bleach

### BONUS

10. GENERAL SCIENCE: Multiple Choice: What term is used for materials, such as wood and cotton, that must generally be processed in some way to make useful products?

- W) ripe
- X) new
- Y) pristine
- Z) raw

ANSWER: Z) raw materials



### TOSS-UP

11. MATH: Multiple Choice: A right triangle always contains one angle that is exactly equal to:

- W) 30 degrees
- X) 45 degrees
- Y) 60 degrees
- Z) 90 degrees

ANSWER: **Z) 90 degrees**

### BONUS

11. MATH: Short Answer: Calculate the area of a trapezoid in square inches if the two bases are 6 inches and 10 inches and the height is 8 inches.

ANSWER: **64** square inches  $([6 + 10] / 2 \times 8)$

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### TOSS-UP

12. GENERAL SCIENCE: Short Answer: In geology, it is the underground point directly underneath the epicenter of an earthquake. Give this word that, as a noun, is where rays of light meet to form an image and, as a verb, is what you do with your camera before taking a picture.

ANSWER: **focus**

### BONUS

12. GENERAL SCIENCE: Multiple Choice: Pyrite is an iron sulfide used to make sulfuric acid but is better known as a poor substitute for what precious metal?

- W) silver
- X) gold
- Y) platinum
- Z) titanium

ANSWER: **X) gold** ("fool's gold")



### TOSS-UP

13. EARTH SCIENCE: Short Answer: What instrument, invented in 1643 by Torricelli (tor-a-CHELL-ee) as a glass tube filled with mercury, is still used to measure atmospheric pressure?

ANSWER: barometer

### BONUS

13. EARTH SCIENCE: Short Answer: As the earth rotates around its axis, the pull of the sun and moon on the earth causes the earth's axis to wobble back and forth, so that the axis line traces out a circle once every 26,000 years or so. Give the term for this wobbling of Earth's axis.

ANSWER: precession (accept forms of the word)

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### TOSS-UP

14. PHYSICAL SCIENCE: Multiple Choice: To the nearest tenth, the constant value of gravitational acceleration in meters per second squared is:

- W) 11.2
- X) 9.8
- Y) 7.5
- Z) 4.9

ANSWER: X) 9.8

### BONUS

14. PHYSICAL SCIENCE: Short Answer: Blocking your chimney, running a charcoal grill inside your house, and running your car engine in a closed garage are three common ways to generate what deadly chemical compound?

ANSWER: carbon monoxide or CO



### TOSS-UP

15. MATH: Multiple Choice: The number of degrees in  $9\pi/10$  radians is equal to:

- W) 81 degrees
- X) 135 degrees
- Y) 162 degrees
- Z) 324 degrees

ANSWER: **Y) 162 degrees** ( $9\pi/10 \times 180/\pi$ )

### BONUS

15. MATH: Short Answer: Given the standard quadratic equation  $Ax^2 + Bx + C = 0$ , what is the only value of  $x$  that solves the equation if  $B^2 = 4AC$ ?

ANSWER:  $x = \underline{-B/2A}$

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### TOSS-UP

16. LIFE SCIENCE: Multiple Choice: Which of the following is NOT one of the main lobes of your brain's cerebrum [sa-REE-brum]?

- W) temporal lobe
- X) occipital [ok-SIP-a-tul] lobe
- Y) frontal lobe
- Z) thoracic [tha-RASS-ick] lobe

ANSWER: **Z) thoracic lobe**

### BONUS

16. LIFE SCIENCE: Short Answer: The acorn and the goose are two species of what sea creature that uses material from its "cement" gland to attach itself to the bottom of boats?

ANSWER: **barnacle**



### TOSS-UP

17. EARTH SCIENCE: Multiple Choice: Agate, amethyst, and opal are all varieties of--what mineral made of silicon dioxide and used in watches?

- W) gypsum
- X) graphite
- Y) marble
- Z) quartz

ANSWER: Z) quartz

### BONUS

17. EARTH SCIENCE: Short Answer: It began 65 million years ago and contains the Tertiary and Quaternary Periods. Name the geologic era in which we currently live.

ANSWER: Cenozoic Era

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### TOSS-UP

18. PHYSICAL SCIENCE: Short Answer: What fifth-most-abundant chemical element in the Earth's crust also forms 1.5% of the human body, including the bones and the teeth?

ANSWER: calcium

### BONUS

18. PHYSICAL SCIENCE: Multiple Choice: Which of these is closest to the ratio of the mass of a proton to the mass of an electron?

- W) 2:1
- X) 20:1
- Y) 200:1
- Z) 2000:1

ANSWER: Z) 2000:1 (1,836:1, to be exact)



### TOSS-UP

19. LIFE SCIENCE: Multiple Choice: What material, made from linked molecules of glucose, is the main ingredient of the walls of a plant cell?

- W) chlorophyll
- X) cellulose
- Y) phloem [FLO-um]
- Z) xylem

ANSWER: X) cellulose

### BONUS

19. LIFE SCIENCE: Short Answer: Its cells convert sugar into carbon dioxide and alcohol, allowing it to be used as a fermenting agent. Name this single-celled fungus also used in making bread.

ANSWER: yeast

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### TOSS-UP

20. MATH: Multiple Choice: Set A is "multiples of 7 between 30 and 50" and set B is "multiples of 9 between 30 and 50." Which of the following numbers is NOT in the union of these two sets?

- W) 42
- X) 44
- Y) 45
- Z) 49

ANSWER: X) 44

### BONUS

20. MATH: Short Answer: You borrow \$20,000 from the bank at 4% interest per year, compounded annually. If you don't pay any money back for 2 years, how much will you owe at the end of that time?

ANSWER: \$21,632 ( $20,000 \times 1.04 \times 1.04$ ) ("simple" interest would be \$21,600)



### TOSS-UP

21. PHYSICAL SCIENCE: Multiple Choice: What celestial event produced a particle cloud 13 times larger than Earth in October 2003, the largest such event in more than 30 years?

- W) a supernova
- X) a black hole
- Y) a solar flare
- Z) a total eclipse

ANSWER: Y) a solar flare

### BONUS

21. PHYSICAL SCIENCE: Multiple Choice: Which of these adjectives describes a chemical reaction that cannot occur unless heat is added first?

- W) entropy
- X) exothermic
- Y) endothermic
- Z) enthalpy

ANSWER: Y) endothermic

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### TOSS-UP

22. MATH: Short Answer: Assume that one mole of atoms contains exactly  $6 \times 10^{23}$  atoms. How many atoms are in one-third of one picomole [PEE-ko-mole]?

ANSWER:  $2 \times 10^{11}$  ( $6 \times 10^{23} \times 1/3 \times 10^{-12}$ )

### BONUS

22. MATH: Multiple Choice: The least common multiple of 12 and 27 is:

- W) 324
- X) 162
- Y) 108
- Z) 84

ANSWER: Y) 108 ( $3 \times 2 \times 2 \times 3 \times 3$ )



### TOSS-UP

23. LIFE SCIENCE: Short Answer: What do box turtles, woodchucks, black snakes, gophers, toads, bats, and bears all do during the wintertime?

ANSWER: they hibernate

### BONUS

23. LIFE SCIENCE: Short Answer: Glycine [GLY-seen], proline [PRO-leen], tyrosine [TY-ro-seen], lysine [LYE-seen], tryptophan [TRIP-ta-fan] and phenylalanine [fee-null-AL-a-neen] all belong to what set of 20 compounds, used in the human body to make up proteins?

ANSWER: amino acids

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### TOSS-UP

24. GENERAL SCIENCE: Short Answer: Starting points are circles, things to do are rectangles, and decisions to make are diamonds in what pictorial representation of the steps used to solve a computer problem?

ANSWER: flowchart

### BONUS

24. GENERAL SCIENCE: Short Answer: Give the correct spelling of the 12-letter word defined as "the study of how disease spreads in a population".

ANSWER: E-P-I-D-E-M-I-O-L-O-G-Y [ep-a-dee-mee-AW-la-jee]



### **TOSS-UP**

25. PHYSICAL SCIENCE: Short Answer: Using the most common isotopes of carbon-12 and oxygen-16, calculate the atomic weight of carbon dioxide, CO<sub>2</sub>.

ANSWER: 44 (12 + 16 + 16)

### **BONUS**

25. PHYSICAL SCIENCE: Multiple Choice: What scientific unit is defined as “the amount of energy needed to raise the temperature of one gram of water by one degree Celsius”?

- W) BTU
- X) calorie
- Y) joule
- Z) watt

ANSWER: X) calorie

**END OF ROUND 1**



### TOSS-UP

1. PHYSICAL SCIENCE: Short Answer: The Greek philosopher Democritus [da-MOCK-ra-tuss] believed that all things originate from a vortex of tiny, indivisible particles called-- what?

ANSWER: atoms

### BONUS

1. PHYSICAL SCIENCE: Multiple Choice: According to the EPA, a system to remove it should be installed in every house where it creates more than 4 picocuries of radiation per liter of air, especially in houses where people smoke. Name this radioactive chemical element.

- W) radon [RAY-dawn]
- X) uranium
- Y) strontium
- Z) cobalt

ANSWER: W) radon

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### TOSS-UP

2. LIFE SCIENCE: Short Answer: Thomas Morgan's work with fruit flies won him a Nobel Prize for showing that genetic material is found in--what biological objects within the nucleus of a cell?

ANSWER: chromosomes

### BONUS

2. LIFE SCIENCE: Short Answer: In the 18th century, Scottish doctor James Lind discovered that it could be cured by eating lemons and oranges. Name this disease, prevalent among sailors of that era, caused by a lack of vitamin C.

ANSWER: scurvy



### TOSS-UP

3. MATH: Short Answer: Calculate the square root of the fraction  $144/289$ .

ANSWER: 12/17

### BONUS

3. MATH: Multiple Choice: Your high school auditorium has 5 seats in the first row. If each of the other rows has 2 more seats in it than the row in front of it, then the number of seats in the 17<sup>th</sup> row is:

- W) 22
- X) 37
- Y) 39
- Z) 49

ANSWER: X) 37

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### TOSS-UP

4. PHYSICAL SCIENCE: Short Answer: By analyzing Jupiter's eclipse of Io, Danish astronomer Ole Roemer figured it to be at least 515 million miles per hour. What physical constant is actually about equal to  $3 \times 10^8$  meters per second?

ANSWER: speed of light

### BONUS

4. PHYSICAL SCIENCE: Multiple Choice: Xenon [ZEE-nawn], neon, krypton and argon are all part of what group of chemical elements?

- W) halogens
- X) metalloids
- Y) alkali metals
- Z) noble gases

ANSWER: Z) noble gases



### TOSS-UP

5. GENERAL SCIENCE: Multiple Choice: Cannel, boghead, lignite, bituminous [bye-TOO-manuss], and anthracite are all types of:

- W) trees
- X) coal
- Y) roses
- Z) beetles

ANSWER: X) coal

### BONUS

5. GENERAL SCIENCE: Multiple Choice: What communications method was first demonstrated in May 1844 by sending four words from Washington D.C. to a Baltimore railroad station?

- W) telegraph
- X) telephone
- Y) radio
- Z) postal service

ANSWER: W) telegraph

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### TOSS-UP

6. LIFE SCIENCE: Short Answer: Bermuda, Johnson, St. Augustine, and fescue are all types of what common plant that also has a type nicknamed "Kentucky blue"?

ANSWER: grass

### BONUS

6. LIFE SCIENCE: Short Answer: The stigma, the style and the ovary are among the parts of what female reproductive organ of a plant?

ANSWER: pistil



### TOSS-UP

7. EARTH SCIENCE: Short Answer: It measures the rate of heat loss, not the temperature. Name this concept that usually appears in wintertime weather reports.

ANSWER: wind chill

### BONUS

7. EARTH SCIENCE: Short Answer: Cubic, monoclinic, hexagonal, and orthorhombic are among the main ways that atoms are arranged within what type of substance?

ANSWER: crystals

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### TOSS-UP

8. MATH: Short Answer: Calculate the larger of the two consecutive odd numbers whose sum is 112.

ANSWER: 57 (and 55)

### BONUS

8. MATH: Multiple Choice: In the equation "two to the x equals 256", the value of x is:

- W) 8
- X) 7
- Y) 9
- Z) 10

ANSWER: W) 8



### TOSS-UP

9. LIFE SCIENCE: Multiple Choice: Which of the four human blood types is often called the "universal donor" type?

- W) O
- X) A
- Y) B
- Z) AB

ANSWER: W) O

### BONUS

9. LIFE SCIENCE: Short Answer: It is now generally curable by taking two antibiotics and Pepto-Bismol at the same time. Name this stomach ailment caused by the bacteria *H. pylori* [py-LOAR-ee] whose sufferers used to be told to drink lots of milk.

ANSWER: stomach ulcer

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### TOSS-UP

10. GENERAL SCIENCE: Short Answer: What term describes the process of chronologically reorganizing your computer's hard disk files to make the disk more efficient?

ANSWER: defragmentation

### BONUS

10. GENERAL SCIENCE: Multiple Choice: In areas where the soil contains large amounts of iron, what color does it tend to be?

- W) black
- X) yellow
- Y) green
- Z) red

ANSWER: Z) red



### TOSS-UP

11. MATH: Short Answer: A bag has 10 pieces of paper in it, each with a number on it from 1 to 10. If you reach in the bag without looking, what are your chances, in lowest terms, of getting a number less than 7?

ANSWER: 3/5 (do not accept 6/10 because it's not lowest terms)

### BONUS

11. MATH: Short Answer: If  $x = 6$  and  $y = -3$ , calculate the value of  $7x^2 + 12xy + 5y^2$ .

ANSWER: 81

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### TOSS-UP

12. GENERAL SCIENCE: Short Answer: Tradition says that he saw a cat grab at a chicken in a coop and get back a paw full of feathers. Name this 18<sup>th</sup>-century inventor who was thus inspired to develop the cotton gin.

ANSWER: Eli Whitney

### BONUS

12. GENERAL SCIENCE: Short Answer: Platinum, palladium and rhodium are among the metals contained in what car device that minimizes the vehicle's emissions and can be damaged by leaded gasoline?

ANSWER: catalytic converter



### TOSS-UP

13. EARTH SCIENCE: Short Answer: What term is used to describe magma that comes from a volcano and reaches the surface of the earth?

ANSWER: lava

### BONUS

13. EARTH SCIENCE: Short Answer: It is possible in such areas as the Cascadia off America's northwest coast and the Nazca off the west coast of South America. Give the term for this phenomenon where a tectonic plate in the earth dives under a neighboring plate.

ANSWER: subduction

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### TOSS-UP

14. PHYSICAL SCIENCE: Multiple Choice: In chemistry, what lab technique is used to separate solid particles from a liquid?

- W) titrating
- X) decanting
- Y) filtering
- Z) pipetting [pie-PET-ing]

ANSWER: Y) filtering

### BONUS

14. PHYSICAL SCIENCE: Multiple Choice: Conservation of its angular form explains why figure skaters speed up when they pull in their arms. Name this physical quantity that is the product of mass and velocity.

- W) momentum
- X) impulse
- Y) kinetic energy
- Z) torque

ANSWER: W) momentum



### TOSS-UP

15. MATH: Short Answer: Sometimes defined as "the rise over the run", it measures the steepness of a straight line. Identify this graphical quantity represented by the letter 'm' in the equation  $y = mx + b$ .

ANSWER: slope

### BONUS

15. MATH: Short Answer: Calculate the surface area of a sphere with a radius of 8 inches. Use pi in your answer if necessary.

ANSWER: 256 pi square inches ( $4 \times \pi \times 8 \times 8$ )

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### TOSS-UP

16. LIFE SCIENCE: Multiple Choice: This co-winner of the 1944 Nobel Prize for Medicine did not share his prize money with the woman who pointed out the mold growing on his specimens. Name this Scottish discoverer of penicillin.

- W) William Harvey
- X) Joseph Lister
- Y) Sir Frederick Banting
- Z) Sir Alexander Fleming

ANSWER: Z) Sir Alexander Fleming

### BONUS

16. LIFE SCIENCE: Multiple Choice: What plant produces more than 80% of all the fats and oils eaten in America today?

- W) soybeans
- X) corn
- Y) wheat
- Z) sorghum

ANSWER: W) soybeans



### TOSS-UP

17. EARTH SCIENCE: Multiple Choice: The Richter [RICK-turr] scale measures the intensity of:

- W) tidal waves
- X) hurricanes
- Y) floods
- Z) earthquakes

ANSWER: **Z) earthquakes**

### BONUS

17. EARTH SCIENCE: Short Answer: German scientist Alfred Wegener (VAYG-un-er) is credited with this theory, based on the idea that the land on Earth was once a single giant mass. Give the two-word name for this concept that describes how the earth is so split up today.

ANSWER: **continental drift**

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### TOSS-UP

18. PHYSICAL SCIENCE: Short Answer: To the Chinese, it was the chariot of the Heavenly Emperor. To the Germans, it's a wagon; to the British, it's a plow. Name this constellation, once called the Drinking Gourd in the United States.

ANSWER: **Big Dipper**

### BONUS

18. PHYSICAL SCIENCE: Multiple Choice: What term describes a substance that speeds up a chemical reaction without being changed itself?

- W) enzyme
- X) catalyst
- Y) colloid
- Z) placebo [pla-SEE-bo]

ANSWER: **X) catalyst**



### TOSS-UP

19. LIFE SCIENCE: Short Answer: What anesthetic with scientific name "procaine hydrochloride" is often mixed with adrenaline to make it last longer (and sting) when a dentist injects it into your gums?

ANSWER: Novocaine

### BONUS

19. LIFE SCIENCE: Multiple Choice: What part of a cell generally performs the cell's respiratory functions?

- W) lysosome [LIE-sa-soam]
- X) vacuole
- Y) ribosome [RYE-ba-soam]
- Z) mitochondria [MY-ta-KON-dree-a]

ANSWER: Z) mitochondria

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### TOSS-UP

20. MATH: Multiple Choice: The decimal equivalent of the fraction  $1/50$  is:

- W) 0.50
- X) 0.02
- Y) 0.05
- Z) 0.20

ANSWER: X) 0.02

### BONUS

20. MATH: Multiple Choice: What statistical term means "the most frequently-occurring number in a set of numbers"?

- W) mode
- X) range
- Y) median
- Z) mean

ANSWER: W) mode



### TOSS-UP

21. PHYSICAL SCIENCE: Multiple Choice: When drawing a circuit, what element is shown by two parallel lines that represent its charged electrical plates?

- W) inductor
- X) resistor
- Y) capacitor
- Z) diode

ANSWER: Y) capacitor

### BONUS

21. PHYSICAL SCIENCE: Multiple Choice: When sodium hydroxide reacts with hydrochloric acid, the two resulting compounds are:

- W) vinegar and water
- X) bleach and table salt
- Y) water and table salt
- Z) bleach and water

ANSWER: Y) water and table salt

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### TOSS-UP

22. MATH: Short Answer: Calculate the area of the figure bounded by the ordered pairs (0, 0), (5, 0) and (5, 14).

ANSWER: 35 ( $5 \times 14 \times 1/2$ )

### BONUS

22. MATH: Short Answer: The number 6 is called a "perfect number" because it equals the sum of its factors: 1, 2 and 3. Prove that the next "perfect number" is 28 by listing all five of its factors.

ANSWER: 1, 2, 4, 7, 14



### TOSS-UP

23. LIFE SCIENCE: Short Answer: It contains the semitendinosus [sem-i-ten-da-NO-sis] and the biceps femoris [FEE-ma-russ]. Name this muscle that runs from the buttock to the knee along the back of the thigh and is often "pulled" by athletes.

ANSWER: hamstring

### BONUS

23. LIFE SCIENCE: Multiple Choice: It helps the body form red blood cells and genetic material. Name this vitamin lacking in many women who have babies born with spina bifida [SPY-na BIFF-a-da].

- W) thiamine
- X) folic acid
- Y) niacin
- Z) riboflavin

ANSWER: X) folic acid

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### TOSS-UP

24. GENERAL SCIENCE: Multiple Choice: In Microsoft Word, when you hold down the control key and press U, what change is made to your font?

- W) it becomes bold
- X) it becomes underlined
- Y) it disappears
- Z) it gets larger

ANSWER: X) it becomes underlined

### BONUS

24. GENERAL SCIENCE: Short Answer: What word means "a very hot state of matter" to physicists, "a substance with both electrons and positive ions in it" to semiconductor makers, and "the liquid part of blood" to biologists?

ANSWER: plasma

### **TOSS-UP**

25. PHYSICAL SCIENCE: Multiple Choice: Which planet has a satellite named Triton [TRY-tun]?

- W) Neptune
- X) Jupiter
- Y) Mars
- Z) Saturn

ANSWER: **W) Neptune**

### **BONUS**

25. PHYSICAL SCIENCE: Multiple Choice: What quantity is constant in a system that is "isothermal"?

- W) pressure
- X) volume
- Y) temperature
- Z) velocity

ANSWER: **Y) temperature**

**END OF ROUND 2**



### TOSS-UP

1. PHYSICAL SCIENCE: Multiple Choice: Proxima Centauri, at about four light-years from Earth, is the closest star to us other than:

- W) the moon
- X) Venus
- Y) the North Star
- Z) the sun

ANSWER: **Z) the sun**

### BONUS

1. PHYSICAL SCIENCE: Multiple Choice: What type of electrical gate has a 1 value when any of its inputs are off, but a zero when all of them are on?

- W) OR
- X) NOR
- Y) AND
- Z) NAND

ANSWER: **Z) NAND**

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### TOSS-UP

2. LIFE SCIENCE: Short Answer: Though it kills nearly a million people every year, less than 100 Americans a year even catch it any more, partly because of its vaccine that also contains vaccines against mumps and rubella. Name this disease that causes red spots on the body.

ANSWER: **measles**

### BONUS

2. LIFE SCIENCE: Short Answer: What medical condition's Type A is caused by a lack of clotting factor VIII and Type B by a lack of clotting factor IX?

ANSWER: **hemophilia**

### TOSS-UP

3. MATH: Multiple Choice: The highest digit in the hexadecimal or base-16 system is:

- W) the number 9
- X) the number 15
- Y) the letter A
- Z) the letter F

ANSWER: **Z) the letter F**

### BONUS

3. MATH: Short Answer: You are playing backgammon and can win the game if you roll either a double-5 or a double-6 with a pair of standard six-sided dice. What is the probability that you will win the game on the next roll?

ANSWER: **1 in 18** (accept **2 in 36**)

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### TOSS-UP

4. PHYSICAL SCIENCE: Short Answer: What name is given to the time period needed for a radioactive source to lose 50% of its original radiation?

ANSWER: **half-life**

### BONUS

4. PHYSICAL SCIENCE: Multiple Choice: The radioactive chemical element americium [am-a-REE-see-um] is contained in many common brands of what device?

- W) cell phone
- X) smoke detector
- Y) car battery
- Z) paint sprayer

ANSWER: **X) smoke detector**



### TOSS-UP

5. GENERAL SCIENCE: Multiple Choice: A 5% solution of acetic [a-SEE-tick] acid is commonly sold in stores as:

- W) dish soap
- X) vinegar
- Y) bleach
- Z) toilet bowl cleaner

ANSWER: X) vinegar

### BONUS

5. GENERAL SCIENCE: Multiple Choice: Which of these units is approximately equal to two and a half acres?

- W) one hectare [HECK-tair]
- X) one hectometer [HECK-ta-mee-tur]
- Y) one square kilometer
- Z) one square mile

ANSWER: W) one hectare

---

### TOSS-UP

6. LIFE SCIENCE: Short Answer: Watson, Crick and Wilkins shared a Nobel Prize for discovering the double helix structure of what biological molecule?

ANSWER: deoxyribonucleic acid or DNA (accept double helix before it is read)

### BONUS

6. LIFE SCIENCE: Short Answer: After Europeans introduced it to America, it claimed the lives of thousands, including the Indian princess Pocahontas. Name this now-obsolete disease whose first vaccine is credited to Edward Jenner.

ANSWER: smallpox

### TOSS-UP

7. EARTH SCIENCE: Short Answer: The size of its visible portion depends on the altitude of the sun and is greatest when the sun is on the horizon. What is this object often seen after a thunderstorm?

ANSWER: rainbow

### BONUS

7. EARTH SCIENCE: Short Answer: What value, commonly mentioned in weather reports, describes the outside temperature at which the air becomes saturated with water vapor?

ANSWER: dew point

---

### TOSS-UP

8. MATH: Multiple Choice: Multiplying one-third the height by pi and the square of the radius gives you the volume of a:

- W) cylinder
- X) trapezoid
- Y) cone
- Z) pyramid

ANSWER: Y) cone

### BONUS

8. MATH: Short Answer: Your Internet Service Provider charges either 75 cents an hour to surf the Web, or a flat rate of 15 dollars a month. If you are on-line for 60 hours a month, how much money would you save in a year by paying the flat rate of 15 dollars a month?

ANSWER: \$360  $[12 \times \{(60 \times 0.75) - 15\}]$



### **TOSS-UP**

9. LIFE SCIENCE: Short Answer: Newts and salamanders fit into this biological group of vertebrates that spends part of their lives under water and the rest on land. Name this group that also includes frogs and toads.

ANSWER: amphibians

### **BONUS**

9. LIFE SCIENCE: Short Answer: It was used by settlers as an indicator of nearby water because its roots are almost constantly damp. Identify this state tree of Kansas and Nebraska, named for its soft white seeds that blow through the air.

ANSWER: cottonwood

---

### **TOSS-UP**

10. GENERAL SCIENCE: Short Answer: Illustrator, PhotoShop and FrameMaker are all software packages made by what California company that also makes Acrobat?

ANSWER: Adobe

### **BONUS**

10. GENERAL SCIENCE: Short Answer: The space probe *Galileo* was vaporized in 2003 by crashing into what planet whose first four known moons were named by the real Galileo?

ANSWER: Jupiter

### TOSS-UP

11. MATH: Short Answer: If two straight lines are perpendicular to each other, what is the product of their slopes?

ANSWER: -1

### BONUS

11. MATH: Multiple Choice: The largest prime factor of the number 3,162 is:

- W) 2
- X) 17
- Y) 31
- Z) 51

ANSWER: Y) 31 (2 x 3 x 17 x 31)

---

### TOSS-UP

12. GENERAL SCIENCE: Short Answer: It usually consists of a protocol, a host machine, a port, a path and a filename. Give this Internet term better known by its acronym URL.

ANSWER: Uniform Resource Locator (accept URL before it is said)

### BONUS

12. GENERAL SCIENCE: Multiple Choice: In a computer spreadsheet program, the term for a single data-storage area is a:

- W) space
- X) cell
- Y) column
- Z) blank

ANSWER: X) cell



### TOSS-UP

13. EARTH SCIENCE: Multiple Choice: The mineral hematite [HEEM-a-tight] is the main ore of the chemical element:

- W) iron
- X) copper
- Y) aluminum
- Z) lead

ANSWER: W) iron

### BONUS

13. EARTH SCIENCE: Short Answer: What area famous for its light winds and slow ocean currents gets its name from the state of depression felt by the crew members that have to sail through it?

ANSWER: doldrums

---

### TOSS-UP

14. PHYSICAL SCIENCE: Multiple Choice: In Einstein's famous equation  $E = mc^2$ , the letter "c" represents:

- W) the speed of light
- X) electric charge
- Y) potential energy
- Z) mass

ANSWER: W) the speed of light

### BONUS

14. PHYSICAL SCIENCE: Short Answer: What point is reached when a substance's vapor, liquid and solid phases are all in equilibrium?

ANSWER: Z) triple point

### TOSS-UP

15. MATH: Short Answer: If the two short sides of a right triangle are 7 feet long and 24 feet long, how long is the hypotenuse?

ANSWER: 25 feet

### BONUS

15. MATH: Short Answer: Give the TWO solutions of  $x$  for the equation, "The absolute value of the quantity  $x + 3$  equals 5."

ANSWER: 2 and -8

---

### TOSS-UP

16. LIFE SCIENCE: Short Answer: One of its main suborders has two lungs for breathing like humans, while another suborder includes tarantulas. Name this animal whose common types include the black widow.

ANSWER: spider

### BONUS

16. LIFE SCIENCE: Multiple Choice: Since 1948, the Framingham Heart Study has studied factors leading to heart disease through two generations of suburban families that live near what major Eastern city?

- W) Cleveland
- X) New York City
- Y) Philadelphia
- Z) Boston

ANSWER: Z) Boston (Framingham is a suburb of Boston)



### TOSS-UP

17. EARTH SCIENCE: Multiple Choice: What rock is formed by the metamorphosis of limestone?

- W) granite
- X) marble
- Y) quartz
- Z) pumice

ANSWER: X) marble

### BONUS

17. EARTH SCIENCE: Short Answer: It is wetter than a desert but drier than a forest. Name this biome of the western United States that contains thick, thorny shrubs accustomed to dry summers and wet winters.

ANSWER: chaparral

---

### TOSS-UP

18. PHYSICAL SCIENCE: Short Answer: What term is used to describe the gravitational force exerted on a given mass?

ANSWER: weight

### BONUS

18. PHYSICAL SCIENCE: Multiple Choice: Always stored under a non-reactive liquid, its nitrate form appears in "saltpeter". Name this chemical element whose lack in the body causes a condition known as "hypokalemia" [high-po-ka-LEE-mee-a].

- W) potassium
- X) sodium
- Y) phosphorus
- Z) beryllium

ANSWER: W) potassium

### TOSS-UP

19. LIFE SCIENCE: Short Answer: Grevy's, Burchell's, Grant's, Chapman's, and Hartman's are all types of what African animal that protects itself from predators by its stripes?

ANSWER: zebra

### BONUS

19. LIFE SCIENCE: Short Answer: Babies who have it get special lighting in their hospital bassinet. Name this condition caused by excess bilirubin in the blood and signified by a yellowing of the skin.

ANSWER: jaundice

---

### TOSS-UP

20. MATH: Short Answer: Give the correct spelling of the word that describes a triangle where two of the three angles are equal and two of the three sides are congruent.

ANSWER: I-S-O-S-C-E-L-E-S [i-SAW-sa-leez] triangle

### BONUS

20. MATH: Short Answer: If a computer hard disk works in temperatures up to 60 degrees Celsius, calculate its maximum allowable temperature in degrees Fahrenheit.

ANSWER: 140° F  $[(9/5 \times 60) + 32]$



### TOSS-UP

21. PHYSICAL SCIENCE: Multiple Choice: Which of these devices is most commonly launched by a submarine?

- W) grenade
- X) torpedo
- Y) rocket
- Z) bomb

ANSWER: X) torpedo

### BONUS

21. PHYSICAL SCIENCE: Multiple Choice: Give the term for the drops of liquid that develop on the sides of a cold drink when it is set out at room temperature.

- W) condensation
- X) humidity
- Y) perspiration
- Z) evaporation

ANSWER: W) condensation

---

### TOSS-UP

22. MATH: Multiple Choice: The surface area (in square inches) of a cube whose sides are all 4 inches long is:

- W) 24
- X) 48
- Y) 72
- Z) 96

ANSWER: Z) 96 ( $4 \times 4 \times 6$ )

### BONUS

22. MATH: Short Answer: If you own \$10,000 of stock that goes down 20% in the next 6 months and then goes up 30% in the 6 months after that, how much money would you have at the end of the year?

ANSWER: \$10,400 ( $10,000 \times 0.8 \times 1.3$ )

### TOSS-UP

23. LIFE SCIENCE: Short Answer: After an irritant lodges between an oyster's mantle and shell, the epithelium encloses the irritant with nacre (NAY-kur) and begins to create what type of precious gem?

ANSWER: pearl

### BONUS

23. LIFE SCIENCE: Short Answer: Give the correct spelling of the 12-letter word meaning "an organism that doesn't have a backbone."

ANSWER: I-N-V-E-R-T-E-B-R-A-T-E

---

### TOSS-UP

24. GENERAL SCIENCE: Short Answer: The Babylonian god Marduk and the Greek god Zeus both had the same planet named for them. Identify this planet named today for the greatest of the Roman gods that is the largest in our solar system.

ANSWER: Jupiter

### BONUS

24. GENERAL SCIENCE: Multiple Choice: In an airplane, which of these instruments tells you how high you are above sea level?

- W) anemometer [ann-a-MOM-a-tur]
- X) tachometer [tack-AW-ma-tur]
- Y) altimeter [al-TIM-a-tur]
- Z) rudder

ANSWER: Y) altimeter



### **TOSS-UP**

25. PHYSICAL SCIENCE: Multiple Choice: Which of these scientists does NOT have a chemical element named for him?

- W) Glenn Seaborg
- X) Albert Einstein
- Y) Ernest Rutherford
- Z) Sir Isaac Newton

ANSWER: **Z**) Sir Isaac **Newton**

### **BONUS**

25. PHYSICAL SCIENCE: Short Answer: The brightest supernova on record appeared in this constellation in 1572. Identify this group of five stars named for the mother of Andromeda that together form the letter W in the sky.

ANSWER: **Cassiopeia**

**END OF ROUND 3**

### TOSS-UP

1. PHYSICAL SCIENCE: Short Answer: Which planet's orbit around the sun lasts less than 90 days?

ANSWER: Mercury

### BONUS

1. PHYSICAL SCIENCE: Short Answer: Its oxide appears in the mineral cassiterite [KASS-it-a-rite], while its fluoride compound is found in popular toothpastes. Name this metallic element with chemical symbol Sn.

ANSWER: tin

---

### TOSS-UP

2. LIFE SCIENCE: Short Answer: What term refers to trees like the maple, poplar, and walnut that go dormant in the winter after losing their leaves in the fall?

ANSWER: deciduous

### BONUS

2. LIFE SCIENCE: Short Answer: The process of photosynthesis converts carbon dioxide and water into--what two products?

ANSWER: oxygen and sugar (accept glucose)



### TOSS-UP

3. MATH: Short Answer: What ancient Greek mathematician claimed that all right angles are equal and that any two points can be connected by a straight line as part of his five postulates of geometry?

ANSWER: Euclid

### BONUS

3. MATH: Short Answer: What mathematical quantity is described by both its magnitude and its direction?

ANSWER: vector

---

### TOSS-UP

4. PHYSICAL SCIENCE: Short Answer: Beam, arch and suspension are the three main types of—what engineering structure built to help cars go over a body of water?

ANSWER: bridge

### BONUS

4. PHYSICAL SCIENCE: Multiple Choice: What outermost layer of the sun is also one of the sun's coolest parts?

- W) heliosphere
- X) stratosphere
- Y) troposphere
- Z) photosphere

ANSWER: Z) photosphere

### TOSS-UP

5. GENERAL SCIENCE: Short Answer: Granville T. Woods invented so many things still used today that he is called the black equivalent of what inventor of the phonograph and the light bulb?

ANSWER: Thomas Edison

### BONUS

5. GENERAL SCIENCE: Multiple Choice: Air is blown through molten iron, which purifies the iron and prepares it to receive carbon, during what process of steel-making?

- W) Frasch process
- X) Ostwald process
- Y) Haber process
- Z) Bessemer process

ANSWER: Z) Bessemer process

---

### TOSS-UP

6. LIFE SCIENCE: Short Answer: Some oranges and grapes fit into this category, based on its botanical definition of "any fruit that contains its own seeds." Name this type of plant whose varieties also include huckle, goose, black and blue.

ANSWER: berry

### BONUS

6. LIFE SCIENCE: Short Answer: What part of the human body contains the bones commonly nicknamed the "hammer", "anvil" and "stirrup"?

ANSWER: ear



### TOSS-UP

7. EARTH SCIENCE: Short Answer: What word describes either of the two days a year when the Sun is farthest north or south of the celestial equator?

ANSWER: solstice

### BONUS

7. EARTH SCIENCE: Multiple Choice: The Paleozoic Era's Carboniferous Period is divided into two parts that share their names with American states. The two states are:

- W) California and Mississippi
- X) Pennsylvania and Nebraska
- Y) Mississippi and Pennsylvania
- Z) California and Nebraska

ANSWER: Y) Mississippi and Pennsylvania

---

### TOSS-UP

8. MATH: Multiple Choice: Raising any number to the zero power always equals:

- W) zero
- X) one
- Y) the number itself
- Z) ten

ANSWER: X) one

### BONUS

8. MATH: Short Answer: Calculate the value of 6 factorial, usually written as a 6 with an exclamation point after it.

ANSWER: 720 (6 x 5 x 4 x 3 x 2 x 1)



### TOSS-UP

9. LIFE SCIENCE: Multiple Choice: As if the country of Sudan didn't have enough trouble already, thousands of its children now suffer from an incurable ailment known as "nodding disease", which primarily affects what part of the body?

- W) stomach
- X) liver
- Y) neck
- Z) legs

ANSWER: **Y) neck** (they can't control their head nodding back and forth, among other symptoms)

### BONUS

9. LIFE SCIENCE: Short Answer: The discovery of its cause is credited to Robert Koch. Name this disease, now basically gone from the United States, whose bacterium can be passed through bad water and raw sewage and kills its victims by dehydration.

ANSWER: **cholera** [CALL-a-ra]

---

### TOSS-UP

10. GENERAL SCIENCE: Multiple Choice: According to the website of *Scientific American* in 2004, four different crops combine to produce more than half of the world's energy that comes from eating food. Which of these crops is NOT one of the four?

- W) wheat
- X) corn or maize
- Y) potatoes
- Z) soybeans

ANSWER: **Z) soybeans** (the 4<sup>th</sup> crop is rice)

### BONUS

10. GENERAL SCIENCE: Short Answer: Give the full 3-word name of the computer language abbreviated by the letters XML.

ANSWER: **Extensible Markup Language**



### TOSS-UP

11. MATH: Short Answer: During fiscal year 2004, the federal government will spend more than two trillion dollars, which is a 2 with how many zeroes after it?

ANSWER: 12

### BONUS

11. MATH: Short Answer: Give the values for BOTH  $x$  and  $y$  that solve the equations  $4x + 5y = -2$  and  $x + y = 0$ .

ANSWER:  $x = 2, y = -2$

---

### TOSS-UP

12. GENERAL SCIENCE: Multiple Choice: What common drug, now known to reduce the risk of heart attack, also relieves many types of headaches?

- W) antihistamine
- X) decongestant
- Y) aspirin
- Z) Tylenol

ANSWER: Y) aspirin

### BONUS

12. GENERAL SCIENCE: Multiple Choice: In the equation  $PV = nRT$ , temperature is held constant while the pressure is doubled. What happens to the volume?

- W) decreases by 100%
- X) decreases by 50%
- Y) increases by 50%
- Z) increases by 100%

ANSWER: X) decreases by 50%

**TOSS-UP**

13. EARTH SCIENCE: Short Answer: Give the common name for the imaginary "circle" around the earth at 66 degrees, 32 minutes north latitude.

ANSWER: Arctic Circle

**BONUS**

13. EARTH SCIENCE: Multiple Choice: Catastrophism [ka-TAS-tra-fiz-um] and uniformitarianism are two of the main schools of thought in:

- W) astronomy
- X) oceanography
- Y) geology
- Z) biology

ANSWER: Y) geology

---

**TOSS-UP**

14. PHYSICAL SCIENCE: Multiple Choice: At one point during 2002, which one of the following planets could NOT be seen very close to each other in the western sky?

- W) Mars
- X) Neptune
- Y) Venus
- Z) Jupiter

ANSWER: X) Neptune

**BONUS**

14. PHYSICAL SCIENCE: Multiple Choice: The chemical indicator bromthymol [BROM-tha-moll] blue turns blue in a base. What color is it in acid?

- W) red
- X) green
- Y) yellow
- Z) purple

ANSWER: Y) yellow



### TOSS-UP

15. MATH: Multiple Choice: The y-intercept value of the line  $8x = 9y - 27$  is equal to:

- W) 27
- X) 3
- Y) -3
- Z) -27

ANSWER: **X) 3** ( $y = 8/9 x + 3$ )

### BONUS

15. MATH: Short Answer: Your house's half-bathroom is 5 feet long and 8 feet wide, and desperately needs new tile on the floor. If the new tiles are square with sides 6 inches long, how many tiles will you need?

ANSWER: **160** (10 tiles long x 16 tiles wide = 160)

---

### TOSS-UP

16. LIFE SCIENCE: Short Answer: What vital sign of the body is usually measured by tightening a cuff around your arm?

ANSWER: **X) blood pressure**

### BONUS

16. LIFE SCIENCE: Short Answer: What types of animals are studied by an ichthyologist [ick-thee-AW-la-jist]?

ANSWER: **fish**

**TOSS-UP**

17. EARTH SCIENCE: Multiple Choice: The southern wind that brings heavy rain to southern Asia every summer is known as the:

- W) chinook
- X) monsoon
- Y) sirocco
- Z) tundra

ANSWER: **X) monsoon**

**BONUS**

17. EARTH SCIENCE: Multiple Choice: On a map, give the term for a change in altitude over a distance:

- W) elevation
- X) gradient
- Y) divergence
- Z) mountain

ANSWER: **X) gradient**

---

**TOSS-UP**

18. PHYSICAL SCIENCE: Short Answer: What two-word term describes the unreachable temperature at which all atomic motion stops?

ANSWER: **absolute zero**

**BONUS**

18. PHYSICAL SCIENCE: Multiple Choice: In 1961, Yuri Gagarin [gaw-GARR-in] became the first astronaut in space from what country?

- W) People's Republic of China
- X) Hungary
- Y) Soviet Union (or Russia)
- Z) Germany

ANSWER: **Y) Soviet Union (or Russia)**



### TOSS-UP

19. LIFE SCIENCE: Short Answer: Recent studies have discovered a third species of what animal that is different from both the Bactrian and the dromedary?

ANSWER: camel

### BONUS

19. LIFE SCIENCE: Multiple Choice: Your blood type is either "positive" or "negative" based on whether you have:

- W) more red blood cells than white blood cells
- X) AIDS
- Y) more white blood cells than red blood cells
- Z) the rhesus (or Rh) factor

ANSWER: Z) the rhesus (or Rh) factor

---

### TOSS-UP

20. MATH: Multiple Choice: A square is one example --if it has four right angles. Give the more generic term for a parallelogram that has four equal sides.

- W) quadrilateral
- X) rectangle
- Y) polygon
- Z) rhombus

ANSWER: Z) rhombus

### BONUS

20. MATH: Short Answer: Calculate the average of the scores on your last three math exams if the scores are 87, 92, and 73.

ANSWER: 84  $([87 + 92 + 73] / 3)$

### TOSS-UP

21. PHYSICAL SCIENCE: Short Answer: Pasiphae [PASS-a-fay], Leda [LEE-da], Europa [yoo-RO-pa] and Ganymede [GAN-ee-meed] are all satellites of what planet?

ANSWER: Jupiter

### BONUS

21. PHYSICAL SCIENCE: Multiple Choice: Ice normally turns to water and then to steam as its temperature is increased. Give the scientific term for what happens when ice skips over water and goes directly to steam.

- W) pressurization
- X) condensation
- Y) sublimation
- Z) evaporation

ANSWER: Y) sublimation

---

### TOSS-UP

22. MATH: Short Answer: Calculate the value of  $x$  if the three angles of a triangle are  $(4x + 5)^\circ$ ,  $(2x - 9)^\circ$  and  $(5x - 14)^\circ$ .

ANSWER: 18 ( $11x - 18 = 180$ )

### BONUS

22. MATH: Short Answer: Calculate the volume of a sphere with radius 3 inches, using "pi" in your answer if necessary.

ANSWER:  $36\pi$  cubic inches ( $\frac{4}{3} \times 3 \times 3 \times 3 \times \pi$ )



**TOSS-UP**

23. LIFE SCIENCE: Short Answer: What "crazy" European bird is famous for laying its eggs in the nests of other species?

ANSWER: cuckoo

**BONUS**

23. LIFE SCIENCE: Short Answer: The "lady slipper" is just one type of orchid that was shown in 2003 to be related to what green vegetable that grows in "spears" ?

ANSWER: asparagus

---

**TOSS-UP**

24. GENERAL SCIENCE: Multiple Choice: Water naturally travels from an area of high concentration to an area of low concentration by--what process?

- W) active transport
- X) gravity
- Y) evaporation
- Z) osmosis

ANSWER: Z) osmosis

**BONUS**

24. GENERAL SCIENCE: Multiple Choice: The substance THG, newly detectable in Olympic drug tests, is a:

- W) stimulant
- X) depressant
- Y) blood thickener
- Z) anabolic steroid

ANSWER: Z) anabolic steroid

### **TOSS-UP**

25. PHYSICAL SCIENCE: Short Answer: 17th-century Dutch scientist Christian Huygens [HOY-gunz] is credited with making the first clock that used what swinging mechanism to keep time, often seen in grandfather clocks?

ANSWER: pendulum

### **BONUS**

25. PHYSICAL SCIENCE: Short Answer: Added to steel to make it stronger, it has the highest melting point of any metal. Name this chemical element whose symbol is a capital W.

ANSWER: tungsten

**END OF ROUND 4**



### TOSS-UP

1. PHYSICAL SCIENCE: Multiple Choice: Which planet has a bright area called "Scooter", a Small Dark Spot and a Great Dark Spot?

- W) Venus
- X) Pluto
- Y) Saturn
- Z) Neptune

ANSWER: Z) Neptune

### BONUS

1. PHYSICAL SCIENCE: Short Answer: It consists mostly of iron III hydroxide and hydrated iron III oxide. Name this reddish-brown substance that is the most common form of corrosion.

ANSWER: rust

---

### TOSS-UP

2. LIFE SCIENCE: Multiple Choice: The humerus [HYOO-ma-rus] bone is found in your:

- W) leg
- X) arm
- Y) back
- Z) neck

ANSWER: X) arm

### BONUS

2. LIFE SCIENCE: Short Answer: "Failure to progress" and "cephalo-pelvic disproportion" are two common reasons given by doctors for what type of surgery that removes a baby by cutting into the mother?

ANSWER: Cesarean section or C-section

### TOSS-UP

3. MATH: Multiple Choice: The fact that  $7 \times 8 = 8 \times 7$  exemplifies the:

- W) associative property
- X) identity property
- Y) distributive property
- Z) commutative property

ANSWER: **Z) commutative property**

### BONUS

3. MATH: Multiple Choice: Randy was 35 years old when his son Brad was born. If the sum of their two ages now is 65, then Brad is now:

- W) 15 years old
- X) 25 years old
- Y) 35 years old
- Z) 50 years old

ANSWER: **W) 15 years old** ( $2x + 35 = 65$ ; Randy is 50)

---

### TOSS-UP

4. PHYSICAL SCIENCE: Multiple Choice: The bar, the atmosphere, the pound per square inch and the pascal are all units of:

- W) pressure
- X) weight
- Y) temperature
- Z) length

ANSWER: **W) pressure**

### BONUS

4. PHYSICAL SCIENCE: Short Answer: Bronze, brass, and steel are all examples of—what type of material made of two or more metals in combination?

ANSWER: **alloy**



### TOSS-UP

5. GENERAL SCIENCE: Multiple Choice: Many engagement ring "diamonds" are really made of which of these chemical elements?

- W) zirconium [zerr-CO-nee-um]
- X) gallium
- Y) scandium
- Z) vanadium [va-NAY-dee-um]

ANSWER: W) zirconium

### BONUS

5. GENERAL SCIENCE: Short Answer: Philo T. Farnsworth dreamed of it as an Idaho teenager and helped make it happen by licensing his patents for an "image dissector." Name this invention that now allows people to see things that happen a long distance away.

ANSWER: television or TV

---

### TOSS-UP

6. LIFE SCIENCE: Multiple Choice: Several hospitals near Lexington, Kentucky advertise themselves as "equine" [ECK-wine] hospitals, meaning they only accept what type of animal as a patient?

- W) pigs
- X) dogs
- Y) cows
- Z) horses

ANSWER: Z) horses

### BONUS

6. LIFE SCIENCE: Short Answer: In 1960, a U-shaped shunt invented by Belding Scribner was the first long-term application of what technique where a machine helps clean the body of waste products after the kidneys fail?

ANSWER: dialysis

### TOSS-UP

7. EARTH SCIENCE: Short Answer: It is made industrially by electrolyzing water. Identify this second-most abundant element in the earth's crust after silicon.

ANSWER: oxygen

### BONUS

7. EARTH SCIENCE: Multiple Choice: What color of the visible spectrum is between blue and violet?

- W) red
- X) indigo
- Y) green
- Z) orange

ANSWER: X) indigo

---

### TOSS-UP

8. MATH: Short Answer: Draw two horizontal parallel lines AC and DF (with A and D on the left), and a transversal line GH crossing them both (with G at the top). AC and GH intersect at point B, while DF and GH intersect at point E. In this diagram, what is the relationship between the congruent angles GBC and DEH?

ANSWER: alternate exterior angles

### BONUS

8. MATH: Multiple Choice: In the same diagram, the angles ABG and CBE are

- W) vertical angles
- X) alternate interior angles
- Y) corresponding angles
- Z) supplementary angles

ANSWER: W) vertical angles



### TOSS-UP

9. LIFE SCIENCE: Short Answer: Rift Valley fever, encephalitis, dengue fever, yellow fever and malaria are just some of the diseases that humans can catch from being bitten by what insect?

ANSWER: mosquitoes

### BONUS

9. LIFE SCIENCE: Short Answer: An 18th-century epidemic of it in Hungary may explain the stories of vampires, as both vampires and sufferers of this ailment are bothered by bright lights. Name this disease that causes a lack of desire for water.

ANSWER: rabies

---

### TOSS-UP

10. GENERAL SCIENCE: Multiple Choice: Of the major energy sources in America, which one creates the most sulfur dioxide?

- W) petroleum
- X) coal
- Y) nuclear power
- Z) solar power

ANSWER: X) coal

### BONUS

10. GENERAL SCIENCE: Short Answer: Don't use all capital letters. Keep your signature short. Don't get off the topic. Don't "spam" people. These are just some aspects of what set of manners commonly used in online discussion forums?

ANSWER: netiquette

### TOSS-UP

11. MATH: Short Answer: No major-league baseball player has batted .400 [say "four hundred"] for a whole season in more than 60 years. To do it, a player needs how many hits in a season when he has 600 at-bats?

ANSWER: 240 ( $600 \times 0.4$ )

### BONUS

11. MATH: Short Answer: What name describes a line that touches a circle at exactly one point?

ANSWER: tangent line

---

### TOSS-UP

12. GENERAL SCIENCE: Multiple Choice: The part of an automobile that holds most of the engine coolant is the:

- W) carburetor
- X) gas tank
- Y) transmission
- Z) radiator

ANSWER: Z) radiator

### BONUS

12. GENERAL SCIENCE: Multiple Choice: Fossils discovered in 1874 in Wyoming were thought to be from a 70-foot-long dinosaur never before seen, called the "brontosaurus." But in 1974, after scientists were positive that the fossils were from a previously-known dinosaur instead, they began calling the animal:

- W) Triceratops
- X) Stegosaurus
- Y) Tyrannosaurus
- Z) Apatosaurus [a-POT-a-soar-us]

ANSWER: Z) Apatosaurus



### TOSS-UP

13. EARTH SCIENCE: Short Answer: What type of substances can be broken down by organisms into smaller components that can enrich soil?

ANSWER: biodegradable

### BONUS

13. EARTH SCIENCE: Short Answer: Consisting of aluminum oxide, it is the primary component of rubies and sapphires. Name this mineral that, on the Mohs scale, is second only to diamond.

ANSWER: corundum [ka-RUN-dum]

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### TOSS-UP

14. PHYSICAL SCIENCE: Short Answer: What planet's Cassini [ca-SEE-nee] division is located between its A and B rings?

ANSWER: Saturn

### BONUS

14. PHYSICAL SCIENCE: Short Answer: A nebula with the same name is the second point of light in his sword, while the star Betelgeuse is located at his left shoulder. Identify this constellation nicknamed "the Hunter."

ANSWER: Orion [or-I-un]

### TOSS-UP

15. MATH: Short Answer: Calculate the perimeter of a regulation basketball court 94 feet long and 50 feet wide.

ANSWER: 288 feet  $(94 + 50 + 94 + 50)$

### BONUS

15. MATH: Short Answer: Calculate the product of  $(4x + 7)$  and  $(3x - 8)$ .

ANSWER:  $12x^2 - 11x - 56$

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### TOSS-UP

16. LIFE SCIENCE: Multiple Choice: What general part of your body is inflamed if you suffer from hepatitis [hep-a-TIE-tis]?

- W) throat
- X) liver
- Y) heart
- Z) stomach

ANSWER: X) liver

### BONUS

16. LIFE SCIENCE: Multiple Choice: What animal's Brazilian varieties include the muriqui [MOO-ree-kee], the masqued titi, the lion tamarin, the brown howler, the tufted-ear marmoset, and the capuchin [ka-POO-chin]?

- W) parrot
- X) monkey
- Y) snake
- Z) wild boar

ANSWER: X) monkey



**TOSS-UP**

17. EARTH SCIENCE: Short Answer: What unit of measure, used in the petroleum industry, is equal to about 42 U.S. gallons?

ANSWER: one barrel

**BONUS**

17. EARTH SCIENCE: Short Answer: Give the term for a crater that forms at the top of a volcano after the middle has collapsed.

ANSWER: caldera

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**TOSS-UP**

18. PHYSICAL SCIENCE: Short Answer: What term is used for chemical processes that, like some types of exercise, take place only in the presence of oxygen?

ANSWER: aerobic

**BONUS**

18. PHYSICAL SCIENCE: Short Answer: What dye obtained from lichens turns red in the presence of acid and blue in the presence of a base?

ANSWER: litmus paper

### TOSS-UP

19. LIFE SCIENCE: Short Answer: It is popular with humans for its industrial properties, its aroma, and its medicinal value when dealing with breathing problems or a bad cough. Identify this tree, native to Australia, that is also popular with koala bears.

ANSWER: eucalyptus [yoo-ca-LIP-tus]

### BONUS

19. LIFE SCIENCE: Multiple Choice: What Russian scientist won a Nobel Prize for his studies of how to condition dogs?

- W) Dmitri Mendeleev
- X) Andrei Sakharov
- Y) Ivan Pavlov
- Z) Trofim Lysenko

ANSWER: Y) Ivan Pavlov

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### TOSS-UP

20. MATH: Multiple Choice: If  $\frac{1}{3}$  of the 651 students in a math class got an A on the final exam, how many students got an A?

- W) 201
- X) 211
- Y) 217
- Z) 233

ANSWER: Y) 217

### BONUS

20. MATH: Short Answer: In lowest terms, what is the sum of the fractions  $\frac{2}{9}$  and  $\frac{5}{11}$ ?

ANSWER:  $\frac{67}{99}$



### TOSS-UP

21. PHYSICAL SCIENCE: Short Answer: Many children's playgrounds have wooden equipment treated with CCA, which keeps termites and decay out of the wood by using copper and what other chemical element used in many murder mysteries to poison the victim?

ANSWER: arsenic

### BONUS

21. PHYSICAL SCIENCE: Multiple Choice: What type of celestial body got its name because it appeared to give off packets of energy with a particular rhythm?

- W) quasars
- X) asteroids
- Y) pulsars
- Z) meteors

ANSWER: Y) pulsars

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### TOSS-UP

22. MATH: Short Answer: If you make \$25,000 your first year at a job and \$60,000 the second year, how much must you make the third year to average \$40,000 per year overall?

ANSWER: \$35,000

### BONUS

22. MATH: Multiple Choice: How many different combinations of 3 toppings can you get from a pizza shop that offers 5 different toppings? Assume that the order that toppings are put on the pizza doesn't matter.

- W) 60
- X) 40
- Y) 20
- Z) 10

ANSWER: Z) 10  $[(5!) / (3!) (2!)]$



### TOSS-UP

23. LIFE SCIENCE: Short Answer: Its upper part, the unguis [UN-gwiss], surrounds the end of the toe and forms a rim, while the lower subunguis covers the bottom of the toe. Give the term for this hard covering made of keratin [CARE-a-tin] that helps horses walk on hard ground.

ANSWER: hoof

### BONUS

23. LIFE SCIENCE: Short Answer: The plant and the animal kingdoms are two of the five generally-accepted kingdoms of living organisms. Name any one of the other three.

ANSWER: monera, fungi, or protists

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### TOSS-UP

24. GENERAL SCIENCE: Multiple Choice: The annual Iditarod [i-DIT-a-rod] dog sled race honors those who, in the winter of 1925, used their sled dogs to bring the children of Nome, Alaska an antidote to what deadly disease, now vaccinated against at an early age?

- W) tetanus
- X) cholera
- Y) diphtheria
- Z) whooping cough

ANSWER: Y) diphtheria

### BONUS

24. GENERAL SCIENCE: Multiple Choice: Which of these letters does not appear in the chemical symbol of any of the current elements in the periodic table?

- W) J
- X) V
- Y) X
- Z) Z

ANSWER: W) J



### **TOSS-UP**

25. PHYSICAL SCIENCE: Multiple Choice: Which of these units is used to measure capacitance?

- W) millihenries
- X) picofarads
- Y) microns
- Z) kilometers

ANSWER: **X) picofarads**

### **BONUS**

25. PHYSICAL SCIENCE: Short Answer: What electrical parameter is commonly measured in henries?

ANSWER: **inductance**

**END OF ROUND 5**